



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/854,924	05/14/2001	Toshihisa Yokoyama	782_163	7936
25191	7590	12/17/2003	EXAMINER	
BURR & BROWN PO BOX 7068 SYRACUSE, NY 13261-7068			SONG, MATTHEW J	
			ART UNIT	PAPER NUMBER
			1765	
DATE MAILED: 12/17/2003				

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/854,924

Applicant(s)

YOKOYAMA ET AL.

Examiner

Matthew J Song

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 September 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-9, 27 and 28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9, 27 and 28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 27 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 27 recites, "said cooling mechanism directly cools only said oxide single crystal". There is no support in the instant specification for cooling only the oxide single crystal. The specification merely states cooling the oxide single crystal and does not positively recite other cooling of other portions of the crystal does not occur.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-9 and 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imaeda et al (JP 10-265293), where an English Abstract and English computer translation (CT) are provided and an accurate translation can be provided upon request, in view of Shudo et al (US 4,264,407) or Ciszek et al (US 4,075,055).

Imaeda et al discloses a melting a raw material of an oxide single crystal in a crucible 7 (CT [0039]); contacting a seed crystal 15 to a melt of the raw material; drawing the melt from an opening of the crucible by pulling down the seed crystal 15 (CT [0008] and [0029]); providing a first heater 3,4 around the opening of the crucible; growing an oxide single crystal 14; and providing a second heater 12A, 12B around the opening of the crucible. Imaeda et al discloses forming a single crystal fiber or plate (CT [0015]), this reads on applicant's planar form. Imaeda et al also discloses a nozzle 13 provided at the tip of the crucible 7 (Fig 1).

Imaeda et al does not disclose a cooling mechanism for directly cooling the oxide single crystal while the oxide single crystal is being drawn from the opening of the crucible.

Art Unit: 1765

In a method of cooling crystal ribbons, note entire reference, Shudo et al teaches a cooling means may comprise a conduit and plurality of nozzles, through which a gaseous medium is blown over the surface of the grown crystal (col 6, ln 65-68), this reads on applicant's direct cooling only the single crystal, and the cooling rate may be easily be changed during the operation by varying the flow rate of the gaseous medium and the distance between the nozzles and the surface (col 3, ln 60-68 and col 5, ln 65 to col 6, ln 5). Shudo et al also discloses heaters 13, 19 before and after the cooling mechanism 9 (Fig 1a). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Imaeda et al with Shudo et al's cooling mechanism to increase the temperature gradient in the solid-liquid interface by cooling the grown crystal, which is desirable, as evidenced by Mimura et al (US 4,367,200).

In a method of growing a crystal ribbon from a die, Ciszek et al teaches for wider ribbons of greater than 4 centimeters auxiliary cooling techniques are required to assure he desired temperature distribution across the crystal at the solid liquid interface during growth, where cooling is achieved by directing a flow of inert gas in different controlled amounts to different segments of the liquid solid crystal interface so as to maintain the desired growth temperature across the growing body's interface (col 5, ln 1-40), this reads on applicant's cooling mechanism for directly cooling the oxide single crystal while the oxide single crystal is being drawn from the opening. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Imaeda et al with Ciszek et al's cooling mechanism to increase the temperature gradient in the solid-liquid interface by cooling the grown crystal, which is desirable, as evidenced by Mimura et al (US 4,367,200).

Art Unit: 1765

The combination of Imaeda et al and Shudo or the combination of Imaeda et al and Ciszek et al is silent to the cooling mechanism and the second heater are substantially co-linear with respect to one another along the direction in which the oxide single crystal is drawn. Shudo et al teaches the cooling rate may easily be changed during the operation by varying the distance between the nozzles and the melt surface (col 5, ln 65 to col 6, ln 5). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify combination of Imaeda et al and Shudo or the combination of Imaeda et al and Ciszek et al by optimizing the distance of the nozzles of the cooling mechanism with the melt surface to obtain a co-linear heater and cooler arrangement by conducting routine experimentation of a result effective variable (MPEP 2144.05).

Referring to claim 2, the combination of Imaeda et al and Shudo or the combination of Imaeda et al and Ciszek et al teaches cooling, where cooling inherently removes ambient heat.

Referring to claim 3, the combination of Imaeda et al and Shudo or the combination of Imaeda et al and Ciszek et al teaches a flow of inert gas.

Referring to claim 4-5, the combination of Imaeda et al and Shudo or the combination of Imaeda et al and Ciszek et al teaches a nozzle at the tip of a crucible.

Referring to claim 6-9, the combination of Imaeda et al and Shudo or the combination of Imaeda et al and Ciszek et al teaches a fiber, this reads on applicant's planar form.

Referring to claim 27, combination of Imaeda et al and Shudo or the combination of Imaeda et al and Ciszek et al teach the cooling medium is blown over the upper surface of the crystal ribbon ('407 col 8, ln 60-65), this reads on applicant's cools only the oxide single crystal.

Referring to claim 28, the combination of Imaeda et al and Shudo or the combination of Imaeda et al and Ciszek et al teaches a heating means **12A, 12B**, which is located in close proximity to the oxide crystal, therefore reads on applicant's directly heating the oxide single crystal.

5. Claims 1-9, 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mimura et al (US 4,367,200) in view of Shudo et al (US 4,264,407).

Mimura et al discloses an oxide single crystal manufacturing method (col 5, ln 35-40) comprising the step of melting a raw material in a crucible **2** (col 2, ln 50-65), contacting a seed crystal and lowering a growing crystal using rollers **13**, this reads on applicant's pulling down the seed crystal (col 5, ln 15-20 and col 2, ln 60-65). Mimura et al also discloses employing a cooling liquid or like means for cooling the grown crystal to increase the temperature gradient in the solid-liquid interface (col 4, ln 20-25). Mimura et al also teaches a nozzle part **8** and growing fibrous or ribbon-like single crystals, this reads on applicant's planar form (col 6, ln 1-5 and col 3, ln 55-60).

Mimura et al discloses a means for cooling the grown crystal. Mimura et al does not disclose a cooling mechanism for directly cooling the single crystal.

In a method of cooling crystal ribbons, note entire reference, Shudo et al teaches a cooling means may comprise a conduit and plurality of nozzles, through which a gaseous medium is blown over the surface of the grown crystal (col 6, ln 65-68), this reads on applicant's direct cooling only the single crystal, and the cooling rate may easily be changed during the operation by varying the flow rate of the gaseous medium and the distance between the nozzles

Art Unit: 1765

and the melt surface (col 3, ln 60-68 and col 5, ln 65 to col 6, ln 5). Shudo et al also discloses heaters **13**, **19** before and after the cooling mechanism **9** (Fig 1a), where heater **19** reads on applicant's second heater. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Mimura et al with Shudo et al's cooling mechanism with heaters to increase the temperature gradient in the solid-liquid interface by cooling the grown crystal, which is desirable, as evidenced by Mimura et al (US 4,367,200).

The combination of Mimura et al and Shudo is silent to the cooling mechanism and the second heater are substantially co-linear with respect to one another along the direction in which the oxide single crystal is drawn. Shudo et al teaches the cooling rate may easily be changed during the operation by varying the distance between the nozzles and the melt surface (col 5, ln 65 to col 6, ln 5). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify combination of Mimura et al and Shudo by optimizing the distance of the nozzles of the cooling mechanism with the melt surface to obtain a co-linear heater and cooler arrangement by conducting routine experimentation of a result effective variable (MPEP 2144.05).

### ***Double Patenting***

6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground

Art Unit: 1765

provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

7. Claims 1-9 and 27-28 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 3, 13, 22 and 26 of U.S. Patent No. 6,565,654 in view of Shudo et al (US 4,264,407). Although the conflicting claims are not identical, they are not patentably distinct from each other because US 6,565,654 claims a process for producing a planar body of an oxide single crystal comprising the steps of melting a raw material in a crucible, contacting a seed crystal, pulling down the seed crystal, a plurality of heaters are provided in position facing the nozzle and a plurality of devices for supplying a cooling medium in a position facing a nozzle. US 6,565,654 does not claim the cooling medium directly cools the single crystal. Shudo et al teaches a method of growing crystal ribbons using a cooling means comprising a plurality of nozzles through which a gaseous medium is blown over the surface of the grown crystal, this reads on directly cooling (col 3, ln 60-67) and a second heater 19. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify US 6,565,654 with Shudo et al's direct cooling to remove heat effectively, thereby improving productivity ('407 col 2, ln 20-35).

The combination of US 6,565,654 and Shudo et al does not teach the cooling mechanism and second heater are substantially co-linear with respect to one another along the direction in which said oxide single crystal is drawn. Shudo et al teaches the cooling rate may easily be changed during the operation by varying the distance between the nozzles and the melt surface

Art Unit: 1765

(col 5, ln 65 to col 6, ln 5). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify combination of US 6,565,654 and Shudo by optimizing the distance of the nozzles of the cooling mechanism with the melt surface to obtain a co-linear heater and cooler arrangement by conducting routine experimentation of a result effective variable (MPEP 2144.05).

### ***Response to Arguments***

8. Applicant's arguments filed 9/22/2003 have been fully considered but they are not persuasive.

Applicant's argument that Claim 27 does not contain new matter is noted but is not found to be persuasive. Applicant alleges that "said cooling mechanism directly cools only said oxide single crystal" is **implicitly** supported in the written disclosure. Applicant has attempted to distinguish the instant invention by excluding what the inventors did not invent rather than distinctly and particularly point out what they did invent. Excluding cooling of other portions requires an explicit teaching. Any negative limitation or exclusionary proviso must have basis in the original disclosure, note MPEP 2173.05 (i). The instant specification merely states cooling the oxide single crystal and does not positively recite cooling of other portions of the crystal does not occur. The mere absence of a positive recitation is not basis for an exclusion, note MPEP 2173.05 (i).

9. Applicant's arguments with respect to claims 1-9, 27 and 28 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J Song whose telephone number is 703-305-4953. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 703-305-2667. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.


Application/Control Number: 09/854,924

Page 11

Art Unit: 1765

Matthew J Song  
Examiner  
Art Unit 1765

MJS

  
**NADINE G. NORTON**  
**PRIMARY EXAMINER**